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User's Guide for the Tabular Display Report Generator Program (TABDIS)

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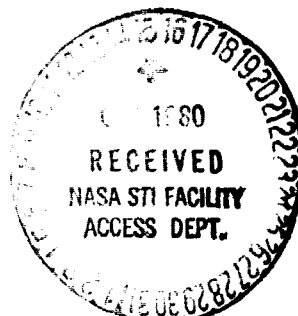
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SHUTTLE PROGRAM

USER'S GUIDE FOR THE TABULAR DISPLAY REPORT GENERATOR PROGRAM (TABDIS)

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Also, the sequence-of-events logic for this updated version of the TABDIS program was programed by Darold Franklin, Software Development Branch, JSC.

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1.0 INTRODUCTION

The tabular display report generator (TABDIS) program has been developed as a document generation tool that provides tabular displays of data stored on a data file which has been generated by a user program. The TABDIS program provides a flexible method of generating document displays. The main features of the program are as follows:

- a. The user specifies (via input) the parameters to appear in each display.
- b. TABDIS requires an input data file in the TRWPLT format. TABDIS user-input directives are similar to the TRWPLT input directives.
- c. TABDIS initializes default values for many options so that a user may obtain displays with a minimum amount of input or override the default values to do detailed design of his own displays.
- d. TABDIS enables user specification of the symbols to be printed by using the symbol record(s) on the input data file. Values of symbols from more than one record type (i.e., vehicle number) may be printed in the same display.
- e. TABDIS allows the user to have documentary comments at the beginning of each display.
- f. TABDIS allows user specification of the formats of each data value printed.
- g. TABDIS automatically centers symbol headings over each data column.
- h. TABDIS allows the user to determine which data records on the input data file are to be displayed.
- i. TABDIS allows for user-defined column headings. If the user does not input column headings, the program builds them automatically using the symbol names.
- j. TABDIS allows the user to define displays that are printed only if certain user-specified data values are found on the data file. These displays are referred to as "event" displays.

2.0 PROGRAM INPUTS

The inputs to TABDIS are of two types: (1) a data file containing the data to be displayed and (2) input cards that define the displays to be drawn. The basic design of the program is to keep the program independent of the program that generated the data to be displayed. This concept makes TABDIS usable by any program application that needs to generate displays of the types which TABDIS can produce.

The data file format is completely general in nature. The data file can be segmented into files as it is created; for example, each file could be a separate data case in the user program. TABDIS can then build displays from a specific file, or display data from several files in the same display. In addition to segmenting data by files, the data within a file can be segmented into different records. For example, a multivehicle trajectory program could have data records for each vehicle in the same file. Finally, the data file contains records that give a symbolic name to each parameter on the file. These symbolic names are then used on the input commands when telling the program what variables are to appear in a specific display. For example, the command

PRINT = A , B

tells TABDIS to generate a display of the values of variables "A" and "B" from the data file.

The data file structure used by TABDIS is the TRWPLT generalized data file format. Complete details of this format are given in section 3.0. This format provides a great deal of user flexibility in generating displays with TABDIS or in generating plots from the data by using the TRWPLT program.

The input cards to TABDIS are free-field format and are of the basic form

SYMBOL = VALUE

where SYMBOL is a name recognized by the TABDIS input processor. Some of the input symbols are keywords recognized by the program and have no value field, but most symbols are followed by integer, real, or character string data. Keyword symbols must appear on a card by themselves. Other input cards can contain several inputs in the format

SYMBOL = VALUE , SYMBOL = VALUE

The user should be able to understand the syntax by simply referring to the input examples at the end of each section of the input definition.

The user is allowed to place comment cards in his input deck. The comments can be on a separate card or can follow the inputs on the same card. The comment delimiters available are the asterisk and the apostrophe. The comment delimiter must be preceded and followed by a blank space. For example,

SYMBOL = VALUE * COMMENT

TABDIS makes use of a generalized input processor that performs a detailed syntax of each input card and writes out messages for each error encountered. When an error is found, the display to which the input applies is not drawn.

Section 2.1 presents a glossary of all the inputs that are given beginning in section 2.2. The input sections are presented in the order of simple inputs first and the more complex ones in the last sections. The novice user can generate displays by simply using the information given in sections 2.2 and 2.3, while the advanced user will probably want to use many of the features defined beginning in section 2.4.

2.1 GLOSSARY OF INPUT VARIABLES

<u>Symbol</u>	<u>Definition</u>	<u>Page</u>
ANNOT ₁	Annotations to be displayed in a sequence-of-events display	2-27
CADD	Additive factors for the print list variables	2-22
CHEAD	Column headings for the columns in a display	2-12
CMULT	Multiplication factors for the print list variables	2-22
DELTA	The display step frequency in tabular displays	2-21
ENDDIS	End-of-display input indicator	2-7
ENDFIL	File-positioning command	2-6
ENDRUN	End-of-run indicator	2-7
FORMAT	Display format specification input	2-14
EVENT	Sequence of events definition input	2-25
HEADER	Display header definition	2-11
HI	Highest value to be displayed in a tabular display	2-21
IPRINT	Debug print selection flag	2-17
KUNIT	Data file unit number	2-6
LO	Lowest value to be displayed in a tabular display	2-21
MAXCOL	Maximum number of columns to allow in a display	2-17
MAXLIN	Maximum number of lines to print on a page	2-17
MLINES	Number of lines required for the next display to be printed on the same page as the previous display	2-17
NFILES	Number of files from the data file to be included in the displays	2-6
NFIRST	Record number of the first record to be displayed in a tabular display	2-20
NFREQ	Display frequency for records in a tabular display	2-20
NOIREC	Data file format type identifier	2-6

<u>Symbol</u>	<u>Definition</u>	<u>Page</u>
NREC	Number of records to be displayed in a tabular display	2-20
PRINT	List of symbols to be displayed in a display	2-7
REWIND	Data file rewind indicator	2-6
SKIP	Data file skip indicator	2-6
TITLE	Display title definition	2-11

2.2 BASIC INPUTS

TABDIS has been designed so that users can generate displays with a minimum number of user input cards required. This has been accomplished by setting most of the inputs to default values before processing the user input cards. This section presents those inputs that are necessary for generating the basic displays available in TABDIS. The sections that follow present the inputs that can be used to enhance the display. Section 2.6 presents the inputs for generating what are referred to as sequence-of-events displays that are very different from the normal TABDIS tabular displays.

The execution of the TABDIS program is invoked by using the Univac EXEC-8 control card

@ XQT FM6*TRWPLT.TABDIS

This card is followed by the user input cards, which fall into the following two general classifications:

- a. Data file control inputs - These inputs tell the program which file or files from the data file are to be used in generating the displays requested on the display command cards that follow.
- b. Display command inputs - These inputs specify what variables are to be shown in a given display.

The final input card is followed by a card containing the word ENDRUN, which tells TABDIS that no further displays are required. This card terminates the execution of the program.

2.2.1 Basic File Control Inputs

The inputs presented here tell the program which file or files from the data file are to be used in the generation of the set of displays that follow these inputs.

- KUNIT = n** Defines the unit number for the input data file. The available units are unit numbers 7 through 29.
- NOIREC** Data file format indicator
- = 0 The data file contains several types of records; therefore, each variable to be displayed must be associated via input with the record identifier number for the record type in which the data are located.
 - = n The data file contains only one type of data record with record identifier equal to n or the user wishes to ignore all records on the file except those with record identifier equal to n.
- This parameter defines the format of the PRINT = card (sec. 2.3.3)
- NFILES = n** Defines the number of files of data to be used from the data file in the generation of the next set of displays (preset to one).
- TABDIS** rewinds the data file after the generation of a display and repositions it to the beginning of the file that was used to generate the display. In this manner, each display will be generated from the same data file or files in the data set until the user changes the file by means of the inputs presented below.
- ENDFIL** This card moves the data file to the next file before generating the next display. This input must appear on a card by itself.
- REWIND** This card causes the data file to be rewound. The symbol REWIND must appear by itself on a card.
- SKIP = n** Position the file forward from its current position past n files. SKIP is a fixed point (integer) input.

2.2.2 Display Command Inputs

This section gives the basic inputs required to generate the simplest display type available in TABDIS. Sections 2.3 and 2.4 present additional inputs that can be used to add titling information and specialized formatting to user displays.

PRINT

This command specifies the variables to be displayed. The variables are identified by their plot symbol names. The command has two forms, based on the value of NOIREC.

NOIREC = 0 expects the format

PRINT = SYMBOL,ID,SYMBOL,ID

but if the ID field is omitted, then an ID value of 1 is assumed.

NOIREC = n requires

PRINT = SYMBOL,SYMBOL,...

where SYMBOL is the variables symbol name on the data file and ID is the record identifier (sec. 3.0) for the data record of the symbols. The symbols are displayed across the display from left to right in the order in which they appear in the PRINT list.

ENDDIS

Identifies the end of the inputs for a specific display.

ENDRUN

Specifies the end of the program execution.

2.2.3 Examples of the Basic Input Commands

@ XQT FM6*TRWPLT.TABDIS

KUNIT = 8 * defines the input data unit

NOIREC = 1 * display data from record type = 1

PRINT = A , B , C , D

ENDDIS

NOIREC = 0

PRINT = A,1,B,1,C,2,D,1

ENDDIS

ENDRUN

These examples would generate displays (in a tabular form) of every record on the file containing the variables in the print list. The only heading information printed would be the symbol name above each column of data in the display. In the next section we will present the complete format of the tabular display and present the inputs needed to obtain titles and headings on the display.

2.3 DISPLAY TITLING INPUTS

The basic TABDIS tabular display format is shown below.

OPTIONAL TITLE LINES			
OPTIONAL HEADER LINES			
CHEAD ₁	CHEAD ₂	...	CHEAD _n
XXX	XXX	...	XXX
.	.		.
.	.		.
XXX	XXX		XXX

The inputs needed to obtain the titling and heading information are presented as follows:

The user can request display titles, display headings, and column headings by means of user input cards, as defined in this section. These inputs are character string data and as such must be input in the following format:

SYMBOL = 'CHARACTER STRING'

Title and HEADER inputs have a special card to allow for lines longer than the 80-column card limit in order to take advantage of the 132-column printer page size. A title or header line longer than 80 columns is input on two cards in the format

SYMBOL = 'CHARACTER STRING'

CONTIN = 'CHARACTER STRING (CONTINUED)'

Column heading inputs can be multiline and, in this case, the input format is

SYMBOL = 'CHARACTER STRING - LINE 1'

, 'CHARACTER STRING - LINE 2'

If the user wishes the apostrophe (') to be in a character string he must place the character twice in a row on the input card in the form

SYMBOL = 'THE 'STRING' TITLE'

which would yield the string

THE 'STRING' TITLE

It should be noted that two apostrophes are not the same as the quote (") character. The following sections give the details for inputting titles, headings, and column headings.

2.3.1 Display Titles and Headings

The display titles and headings are printed at the top of the display. They are printed only on the first page of a multiple-page display. The only real difference between them is that the HEADER input is printed below the TITLE input with three blank lines between them. The same effect could be obtained by inputting three blank lines in the title; however, the reason for having both types of input is to allow the HEADER to make additional explanatory comments about the display that are not really part of its title. Both TITLE and HEADER inputs are optional; they can contain as many lines as desired and each line can contain one CONTIN card. TABDIS automatically centers the title and header in the generated display. Examples of TITLE and HEADER inputs are shown below.

```
line 1 {TITLE = 'THIS IS A DISPLAY'  
      {CONTIN = 'OF THE VEHICLE POSITION VECTOR'
```

```
line 2 {TITLE = 'THIS DATA WAS USED TO PE'  
      {CONTIN = 'RFORM INTEGRATION STUDIES'
```

```
line 1 {HEADER = 'THE (X,Y) POINTS FORM TH'  
      {CONTIN = 'E SINE GRAPH'
```

```
line 2 {HEADER = 'THE (X,Z) POINTS FORM TH'  
      {CONTIN = 'E COSINE GRAPH'
```

2.3.2 Column Heading Inputs

TABDIS places a column heading above each column in the display. This heading is not optional and is printed at the top of each page of a display. The basic form of the CHEAD input card is

```
CHEAD(SYMBOL) = 'CHARACTER STRING'
```

where SYMBOL is the data file symbol name of the variable, which is one of the variables being printed in the current display. If a CHEAD input is not specified for a column in the display, the program will use the symbol name as the heading.

Since column headings cannot be extremely long, the program provides for multiline column headings, as shown by the following example:

```
CHEAD (LAT) = 'VEHICLE'  
            , 'LATITUDE'
```

This will result in the heading

```
VEHICLE  
LATITUDE
```

above the column in the display containing the data for the symbol LAT. Column headings can contain as many lines as desired.

TABDIS has a method for changing the default column heading from the data file symbol to a user-defined symbol of six characters or less. This is done in the print list by the syntax

```
SYMBOL/LABEL/
```

which changes the default CHEAD value from SYMBOL to LABEL.

2.3.3 Examples Using the Title and Heading Inputs

```

TITLE = 'GROUNDTRACK DISPLAY'
TITLE = 'MISSION STS-1'
HEADER = 'VEHICLE GROUNDTRACK'
CONTIN = 'FOR VEHICLE ONE'
PRINT = A,B,C
CHEAD (A) = 'TIME'
      , '(GMT)'
CHEAD (B) = 'LONGITUDE'
      , 'DEG.'
CHEAD (C) = 'LATITUDE'
      , 'DEG.'
ENDDIS

```

This example would generate a display of the form

GROUNDTRACK DISPLAY		
MISSION STS-1		
VEHICLE GROUNDTRACK FOR VEHICLE ONE		
TIME	LONGITUDE	LATITUDE
(GMT)	DEG.	DEG.
XXX.XX	XXX.XX	XXX.XX
.	.	.
.	.	.
.	.	.
XXX.XX	XXX.XX	XXX.XX

2.4 DISPLAY FORMATTING

TABDIS allows the user to specify the format used to print each column in the display. When no such inputs are specified by the user, the default format of E10.5 is used. The basic form of the FORMAT command is

```
FORMAT = '          '
```

where the user inserts the desired format or editing code between the apostrophes. TABDIS has three basic types of FORMAT commands.

- a. Modification of the default format code.
- b. Specification of the format for one or more symbols in the print list.
- c. Specification of the complete FORMAT statement for the print list.

Types 1 and 2 can be used in the same display where the user uses type 1 to define the format used for most of the variables, then uses one or more type-2 format commands to define the formats for the remaining variables.

The format for the first type of FORMAT command is

```
FORMAT = '          '
```

which defines a new default format code to be used on all symbols. The format for the second type of FORMAT command is

```
FORMAT(SYMBOL) = '          '
```

which defines a format for the specific symbol. The user can apply the same format to several symbols, as follows:

```
FORMAT(SYMBOL1,SYMBOL2,...) = '          '
```

The format for the user-defined FORMAT is

```
FORMAT = '(          )'
```

where the user places the entire format in the string just as would be done in coding a Fortran format statement. Certain restrictions apply to the use of this option, but these cannot be given until the editing codes available with TABDIS formats are explained. After covering the editing codes this document will cover the use of user-defined formats in detail.

2.4.1 TABDIS Editing Codes

TABDIS provides the user with a great deal of flexibility in defining the editing code to be used in displaying the individual items in a display print list. The program uses many of the standard Fortran editing codes plus several special codes of its own. The editing codes available are shown below.

<u>Code</u>	<u>Syntax</u>	<u>Definition</u>
A	An	Display n characters of character data in alphanumeric format.
A	mAn	Display m times n characters of character data in alphanumeric format.
DHMS	DHMS	Display a time in the format days:hours:minutes:seconds.
D	Dm.n	Display a double-precision value in a field m characters wide with n digits to the right of the decimal point.
E	Em.n	Display a single-precision value in a field m characters wide with n digits to the right of the decimal point.
F	Fm.n	Display a single-precision value in a field m characters wide with n digits to the right of the decimal point, but with no exponential field as is used with the D and E formats.
HMS	HMS	Display time in the format hours:minutes:seconds
I	In	Display an integer value in a field n characters wide.
LAT	LAT	Display a latitude position with the north or south indicator present.
LON	LON	Display a longitude position with the east or west indicator present.
O	On	Display a value in octal in a field n characters wide.

2.4.2 User-Defined Format Restrictions

The TABDIS user can define his own display formats within the following limitations:

- a. The user should not use the apostrophe (') to define Hollerith data but should use nH fields. This is because TABDIS uses the apostrophe (') character to define the start and stop of string input fields.
- b. With a user-defined format, TABDIS does not perform any data conversion; thus, the following restrictions apply:
 - (1) Double-precision data cannot be printed
 - (2) Integer data cannot be printed unless true integers are on the data file. The current form of the TABDIS automatic mode converts data to integer if requested.
 - (3) String fields can be printed if they consist of only one data word on the file or if each word on the file is listed in the print list. The automatic mode can print a string with only the first word in the print list by using the A-FORMAT.
- c. The normal column heading input cannot be used because the program will not know where the data columns will be placed. HEADER cards could be used to build the headings, or the user can input a complete column heading by the input format

CHEAD = '()'

which is of the same syntax as the user-defined FORMAT input.
- d. If annotations are desired in a user format, it would be simpler to place the annotation data in nH fields in the format instead of trying to use A6 fields.

2.4.3 Additional Formatting Inputs

In the automatic formatting mode, TABDIS computes the number of character positions required for a display and then uses the remainder of spaces available to place spaces between the various items in the print line. This logic tends to center the display on the page. The following inputs can modify the final appearance of a display.

- | | |
|------------|---|
| MAXCOL = n | This input reduces the number of columns used on a line from the standard 132 to a user-defined value. The program will then center its display in the n character positions available to it. This is used for generating page-size displays and displays on CRT screens. |
| MAXLIN = n | This input defines the number of lines to be used on a page. The default value is 56. |
| MLINES = n | This input is used only with sequence-of-events displays. It defines the number of lines to be used by the next display where the program will place the display on the page with the previous display if space is available. |
| IPRINT = 1 | This is a debug-only option. It prints the format statement created by TABDIS for the display lines along with the format for the column headings. It is used when trying to ascertain why a display did not come out as expected. |

2.4.4 Examples of Formatting Inputs

The examples below illustrate the TABDIS formatting inputs defined in the previous sections.

```

PRINT = A , B , C
FORMAT = 'E20.8'
ENDDIS                                * use E20.8 on all variables

PRINT = A , B , C
FORMAT = 'E20.8'
FORMAT(B) = 'F10.2'
ENDDIS                                * define default format as E20.8
                                      * input a specific format for B

PRINT = A , B , C
FORMAT(A,C) = 'E20.8'
FORMAT(B) = 'E15.5'
ENDDIS                                * define formats for A and C
                                      * define format for B

PRINT = A , B , C
FORMAT = '(10X,E15.6,2X,2E20.5)'
CHEAD = '(15X,1HA,16X,1HB,14X,1HC)'
ENDDIS                                * user-defined format
                                      * user-defined CHEAD

PRINT = A , B/LABEL/ , C
ENDDIS                                * the default CHEAD will be
                                      * A      LABEL      C

```


2.5 DATA SELECTION INPUTS

When TABDIS sets up a data file in preparation for drawing a tabular display, all data records in the file or files selected are printed in the display. The inputs in this section give the user the ability to generate a display using only a subset of the data records. Additional inputs are provided in this section that allow the user to modify the data by adding a constant to each value or multiplying each value by a constant.

2.5.1 Data Selection by Record Counting

One method of reducing the number of lines in a tabular display is to specify the records to be displayed by using the following inputs:

NFIRST = n The record number of the first record to be included in the display.

NREC = n The number of records to be included in the display.

NFREQ = n Use only every nth record in the display.

The default value of each of these values is zero. The defaults have the following meanings:

NFIRST Start with the first data record.

NREC Use all records in the file or files selected by NFILES.

NFREQ Use every data record.

2.5.2 Data Selection by Data Value

These inputs function similar to the record counting inputs, but allow the user to define the starting and ending points of the display in terms of data values rather than record count.

LO = SYMBOL,ID,VALUE

Defines the starting value of the display. The program will skip all data records until the value of SYMBOL crosses the user-specified value. The crossing can be from above or below.

HI = SYMBOL,ID,VALUE

Defines the end value of the display. When the program reaches the record where the value of SYMBOL crosses the specified value from either above or below, the display is terminated.

DELTA = SYMBOL,ID,VALUE

This input allows the user to display a subset of the records. The program will keep track of the value of the symbol at a display point, and will not display a record again until a value is reached that is the specified delta away from the last printed record.

These inputs must be reinput for each display desired. The user does not have to use all of them, but may use any that he wishes to obtain his display.

2.5.3 Data Value Modification Inputs

These inputs enable the user to modify the data to be displayed. This capability is primarily used to perform units conversion on the displays or to reference values from a specific value in a display. The basic equation used is

$$C = CMULT * VALUE + CADD$$

where

C = The value displayed

CADD = An input value added to the data value (defaulted to 0.0)

CMULT = A value multiplied by the data value (defaulted to 1.0)

VALUE = The data value from the data file

The user inputs required to exercise this capability are as follows:

CADD = V_1, V_2, \dots, V_n	Defines the addition factor for each column of the display; i.e., for each print list variable.
-------------------------------	---

CMULT = V_1, V_2, \dots, V_n	Defines the multiplication factor for each print variable.
--------------------------------	--

These inputs carry over from one display to the next and should be reset to zero when they are no longer required. When the print list contains annotations (sec. 2.6.2) they must be counted in determining the relation between a position in the CADD and CMULT arrays and the variables to which they apply. Because the annotation logic will ignore its CADD and CMULT values, any value can be input for these positions in the CADD and CMULT lists.

2.5.4 Examples Using the Data Selection Inputs

The following examples are given as illustrations of the data selection inputs.

```
NFIRST = 5
NFREQ = 2
NREC = 10
PRINT = A , E
ENDDIS
```

- * Begin the display with record 5.
- * Display every other record.
- * Display a total of 10 records.

```
NOIREC = 1
LO = ALPHA , 10.0
```

- * Begin the display when a record
- * is found with ALPHA greater than
- * or equal to 10.0. Notice that
- * a record ID is not needed with the
- * NOIREC input.

```
HI = ALPHA,20.0
```

- * Terminate the display when ALPHA
- * reaches 20.0.

```
PRINT = A , B , C
ENDDIS
```

```
CADD = 1.0,0.0,1.0
```

- * Add 1.0 to each value of A and C
- * in the display.

```
PRINT = A , B , C
ENDDIS
```

2.6 SEQUENCE-OF-EVENTS DISPLAYS

In addition to the standard tabular display format available in TABDIS, the program has an alternate display type, which is referred to as a sequence-of-events display. These displays are similar to the tabular format except for the following:

- a. Each line printed in the display is requested by the user defining a specific event condition.
- b. The display line usually contains certain explanatory information defining the event. This input is called an annotation.
- c. The complete display can have many different event conditions, with separate PRINT lists and FORMAT inputs for each line.

The program has provisions for the following two basic types of sequence-of-events displays:

- a. Several events printed in the same display.
- b. Several print lines at a single event.

The following pages give the detailed inputs necessary to obtain sequence-of-events displays.

2.6.1 The EVENT Card Structure

The EVENT card is used to define the condition upon which a display PRINT line is to be printed. The format of the EVENT card is as follows:

EVENT = SYMBOL(ID) , VALUE , FLAG , TOL , ALL

where

SYMBOL = The variable name of the variable upon which the condition is based.

(ID) = The record ID, which is used only if NOIREC = 0. If NOIREC = 0 and the ID is not present, a value of 1 is assumed.

VALUE = The value of the variable that defines the desired event.

FLAG = An indicator that defines what condition is to be met by the value at the event point.

EQ = Equality.

NE = Not equal to.

GT = The value of the variable crosses the specified value going in the upward direction.

GE = The value of the variable crosses or reaches the specified value going in an upward direction.

LT = The value of the variable crosses the specified value going in a downward direction.

LE = The value of the variable crosses or reaches the specified value going in a downward direction.

TOL = An optional tolerance used in testing for the satisfying of an event condition. This is used as follows: Let V be a value from the data file. The program then uses $V + TOL$ and $V - TOL$ as an interval to test for the meeting of the condition. Users should be aware that a tolerance of exactly zero could result in a failure on an EQ test because of numerical roundoff; thus, a small tolerance is advisable even on EQ events.

ALL = An optional field which indicates that this event occurs several times on the file and each is to be displayed. Without the ALL symbol, only the first occurrence will be displayed.

A second EVENT card format exists for a special condition called a double-equality event. The card format is

EVENT = (SYMBOL(ID),VALUE,SYMBOL,VALUE,UNIQUE)

where

SYMBOL(ID)VALUE = Specifies two conditions that are to be met by exact equality. These conditions should be integer data or alphanumeric data where the equality will not have numerical problems. Notice that only one record ID is allowed. Both symbols must be from the same data file record.

UNIQUE = This is an optional field that allows the user to define several events with the exact condition. This is similar to the ALL type logic on the normal event input except that in this case each event desired must have another EVENT card with the same condition. The first EVENT card will be matched with the first data file record found that satisfies the condition specified on the EVENT card. The second EVENT card will be paired with the second occurrence of the condition, etc. Different annotation inputs may be used on the different events.

2.6.2 Event Annotations

In a display, event annotations allow the user to include line data that is not on the data file. The format of the annotation input card is similar to TITLE and CHEAD cards. The inputs are character string data in the form

ANNOT_i = 'CHARACTER STRING'

where i = 1, 2, or 3. The annotations can have continuation cards just as with CHEAD inputs.

Up to three annotations are allowed, and their placement on the page is determined by their position in the PRINT = list. CHEAD inputs are required for the annotations used in order to obtain the heading above the annotation column. Annotations normally do not require FORMAT cards. Exceptions are made in certain cases with multiple-print lines at a single event, which will be considered later in this section.

Annotations are used instead of A-FORMAT data from the data file for the following two main reasons:

- a. To modify the description without having to re-create the data file.
- b. To provide multiline annotations whereas the A-FORMAT data are only single-line outputs.

The annotations and A-FORMAT alternatives for event displays will have to be decided upon by each user's application. They each have advantages in certain situations.

2.6.3 Multiple Event Displays

The format of this event display allows multiple events to be shown in the same display, but allows only one print list. The outline of the input cards is shown below.

```

TITLE =
HEADER =
EVENT =
PRINT =
ANNOT1 =
CHEAD =
EVENT = {           inputs for event 2
ANNOT1 = }
EVENT = {           inputs for event 3
ANNOT1 = }
.
.
.
ENDDIS

```

The lines will be displayed in the order in which they are located as the program reads down the data file. If two or more events are found in the same data record, they will be printed in the order that they are input. Notice that the ANNO_T₁ cards follow the event card to which they apply.

2.6.4 Multiple Print Lines at a Single-Event Display

The format of this event display allows only a single event in the display, but allows several print statements with their own formats and annotations. The outline of the input card sequence is shown below.

TITLE =	}	inputs for the first print line and titles
EVENT =		
PRINT =		
CHEAD =		
FORMAT =		
ANNOT ₁ =	}	inputs for the second print line
PRINT =		
FORMAT =		
ANNOT ₁ =	}	inputs for the third print line
PRINT =		
FORMAT =		
ANNOT ₁ =	}	inputs for the last print line
PRINT =		
FORMAT =		
ANNOT ₁ =		
ENDDIS		

FORMAT specifications are optional on each print list in the display. If CHEAD input is used, then the CHEAD() cards should refer to the first print list. Notice that the PRINT = card begins the inputs for each new print line after the first print line.

The lines in this type of display are printed in the order that they are input. The annotation inputs are used to label each line of the display. Consider the following example:

```

TITLE = 'CONDITIONS AT ENTRY'
CHEAD (ANNOT1) = 'DEFINITION'
CHEAD (TIME) = 'VALUE'
PRINT = ANNOT1 , TIME
ANNOT1 = 'TIME'
PRINT = ANNOT1 , HD
ANNOT1 = 'ALTITUDE'
ENDDIS

```

The display would have the form

CONDITIONS AT ENTRY	
DEFINITION	VALUE
TIME	XXXX.XX
ALTITUDE	XXXX.XX

If the user attempts to run the above example, the display might not come out with the various lines of the display properly aligned. This is caused by one of the following reasons:

- Annotations of various lengths.
- The user changes the FORMAT specifications from one print list to the next.
- The user changes the number of print list items from one print line to the next.

Some of these problems can be reworked to produce a properly aligned display. The user can input his annotations with the same length by adding blank characters on the end, or he can input a card of the form

```
FORMAT(ANNOT1) = An
```

which reserves n character positions for the annotation column where n is greater than or equal to the longest annotation line.

When the user changes FORMAT specifications on a multiple print list event display, he must remember the following:

- If he does not specify a format for some items in the print list, then the default format will be used for those items.
- If he specifies formats of different lengths in different print lists, this could shift the print columns out of proper alignment.

2.6.5 Event Input Examples

The examples below illustrate the two basic forms of the sequence-of-events display.

```
TITLE = 'SEQUENCE OF EVENTS DISPLAY'
EVENT = X , 10.0 , GT          * event with no tolerance input
PRINT = X , Y , THETA
EVENT = X , 20.0 , GT , 0.001  * event with a tolerance input
ENDDIS
```

```
TITLE = 'TITLE'
EVENT = X, 25.0 , EQ , 0.01
PRINT = ANNOT1 , X
ANNOT1 = 'X - VALUE'
PRINT = ANNOT1 , Y
ANNOT1 = 'Y - VALUE'
ENDDIS
```

2.7 INPUT CARD ORDERING RULES

A few rules relating to input card ordering were mentioned in the preceding sections of this document. They are being repeated here as a reference for the benefit of the program users.

- a. Cards such as TITLE, HEADER, CHEAD, and FORMAT, which can have several cards of input, must have all their input cards in consecutive order.

```
TITLE =
TITLE =      is legal
PRINT =
```

```
TITLE =
PRINT =      is not legal
TITLE =
```

- b. Cards for CHEAD and FORMAT must follow the PRINT card because they reference the print list variable names that must be known by the program prior to their being referenced.

```
PRINT = A
FORMAT(A) =      is legal
CHEAD(A) =
```

```
CHEAD(A) =      is not legal
PRINT = A
```

- c. In sequence-of-event displays with multiple events in a display, the EVENT card begins the inputs for each new event; therefore, all its data cards must follow this card.
- d. For sequence-of-event displays with one event and multiple print lists, the PRINT card begins the inputs for each print line in the display; therefore, all other data cards referring to a specific print line must follow this card.

3.0 DATA FILE FORMAT

The format of the data file used by TABDIS has been designed to be compatible with the generalized nature of the program. The format allows the file to contain data from different sources as well as data generated at varying frequencies of the same independent variable.

Each record on the file contains a record identifier that associates it with a particular data source. For instance, a multivehicle trajectory program might associate each record with a particular vehicle. The record identifier is specified as a number (such as 1, 2, or 3, etc.), and that same number is used on the user input commands to reference the desired record type. In the case where only one data source is present on the file, TABDIS is given this fact on an input card and the user does not have to put record identification numbers on any of his TABDIS commands.

The format of each record of the data file is as follows:

IREC, N, DATA₁, DATA₂,,, DATA_N

where

IREC = The record identification number.

N = The number of variables in the data set for this record.

DATA = The data values for this record.

In the user program, the data records should be written with a nonformatted WRITE statement; for example

```
WRITE (7) IREC,N,(DATA(I),I=1,N)
```

After all records have been written onto the file that the user desires in a specific file of the data file, he should close the file with the Fortran end-of-file command END FILE. The file can have as many files of data as the user desires. On the Univac EXEC-8 system, the data can be written to either a disk file or to magnetic tape.

TABDIS requires the user to identify each data item in each record by a symbolic name. This symbolic name is then to be used in identifying the variable on all display commands which must reference that variable. The data file must contain a symbol record for each record type on the file. The format of the symbol record is

JREC, N, SYMBOL₁, SYMBOL₂,,, SYMBOL_N

where

JREC = -IREC.

N = The number of symbols in this record.

SYMBOL = The symbols for each variable in this record type. The symbols are each one field data word of up to six characters and are left-justified and blank-filled to the right.

The symbol records for all record types in a file must be the first records written on each file of the data file.

4.0 SAMPLE OUTPUT DISPLAYS

The TABDIS run presented in this section illustrates most of the capabilities of the TABDIS program.

```

1 .....
2 .....
3 .....
4 .....
5 DISPLAY NUMBER 1 .....
6 .....
7 .....
8 .....
9 .....
10 .....
11 .....
12 .....
13 .....
14 .....
15 .....
16 .....
17 .....
18 .....
19 .....
20 .....
21 .....
22 .....
23 .....
24 .....
25 .....
26 .....
27 .....
28 .....
29 .....
30 .....
31 .....
32 .....
33 .....
34 .....
35 .....
36 .....
37 .....
38 .....
39 .....
40 .....
41 .....
42 .....
43 .....
44 .....
45 .....
46 .....
47 .....
48 .....
49 .....
50 .....
51 .....
52 .....
53 .....
54 .....
55 .....
56 .....

```


[illegible]

```

234*      .JMX -.E20.8.3X.3M2 -.E15.4.6H7M2A-.E15.6)
235*      EVENT = 2.30.0 . 01
236*      EVENT = X.5.0. 01
237*      EVENT = SINCETA. -0.5 . LT
238*      ENDOIS
239*      .....
240*      .....
241*      .....
242*      .....
243*      .....
244*      .....
245*      .....
246*      .....
247*      ENDRUN

```

DISPLAY NUMBER 1 - DISPLAY DATA FOR ALL SYMBOLS USING THE DEFAULT FORMAT £10.5
FOR HEADING PURPOSES. SYMBOL A WILL BE TITLED RADIUS

THE (THETA.SINETHA) POINTS GIVE THE SINE GRAPH
THE (THETA.CTHETA) POINTS GIVE THE COSINE GRAPH
THE (X.Y) POINTS GIVE THE X-SQUARED FUNCTION
THE (Z.Q) POINTS GIVE THE Q-FUNCTION GRAPH

THETA	SINETHA	CTHETA	X	Y	Z	Q
.0000	.0000	.1000+01	.0000	.0000	.0000	.5000+02
.02832-01	.62790-01	.99803+00	.5000+00	.2500+00	.2000+00	.50200+02
.12566+00	.12533+00	.99211+00	.1000+01	.1000+01	.4000+00	.50400+02
.18850+00	.18738+00	.98229+00	.1500+01	.2250+01	.6000+00	.50600+02
.25133+00	.24869+00	.96858+00	.2000+01	.4000+01	.8000+00	.50800+02
.31416+00	.30902+00	.95106+00	.2500+01	.6250+01	.1000+01	.51000+02
.37699+00	.36812+00	.92978+00	.3000+01	.9000+01	.1200+01	.51200+02
.43982+00	.42578+00	.90483+00	.3500+01	.12250+02	.1400+01	.51400+02
.50265+00	.48175+00	.87631+00	.4000+01	.1600+02	.1600+01	.51600+02
.56549+00	.53583+00	.84433+00	.4500+01	.20250+02	.1800+01	.51800+02
.62832+00	.58778+00	.80902+00	.5000+01	.2500+02	.2000+01	.52000+02
.69115+00	.63742+00	.77051+00	.5500+01	.30250+02	.2200+01	.52200+02
.75398+00	.68455+00	.72897+00	.6000+01	.3600+02	.2400+01	.52400+02
.81681+00	.72897+00	.68455+00	.6500+01	.42250+02	.2600+01	.52600+02
.87965+00	.77051+00	.63742+00	.7000+01	.4900+02	.2800+01	.52800+02
.94248+00	.80902+00	.58778+00	.7500+01	.56250+02	.3000+01	.53000+02
.10053+01	.84433+00	.53583+00	.8000+01	.6400+02	.3200+01	.53200+02
.10681+01	.87631+00	.48175+00	.8500+01	.72250+02	.3400+01	.53400+02
.11310+01	.90483+00	.42578+00	.9000+01	.8100+02	.3600+01	.53600+02
.11938+01	.92978+00	.36812+00	.9500+01	.90250+02	.3800+01	.53800+02
.12566+01	.95106+00	.30902+00	.1000+02	.1000+03	.4000+01	.54000+02
.13195+01	.96858+00	.24869+00	.1050+02	.11025+03	.4200+01	.54200+02
.13823+01	.98229+00	.18738+00	.1100+02	.12100+03	.4400+01	.54400+02
.14451+01	.99211+00	.12533+00	.1150+02	.13225+03	.4600+01	.54600+02
.15080+01	.99803+00	.62792-01	.1200+02	.14400+03	.4800+01	.54800+02
.15708+01	.1000+01	.14484-05	.1250+02	.15625+03	.5000+01	.55000+02
.16336+01	.9803+00	.62789-01	.1300+02	.16900+03	.5200+01	.55200+02
.16965+01	.95211+00	.12533+00	.1350+02	.18225+03	.5400+01	.55400+02
.17593+01	.9229+00	.18738+00	.1400+02	.19600+03	.5600+01	.55600+02
.18221+01	.8858+00	.24869+00	.1450+02	.21025+03	.5800+01	.55800+02
.18850+01	.85106+00	.30902+00	.1500+02	.22500+03	.6000+01	.56000+02
.19478+01	.81681+00	.36812+00	.1550+02	.24025+03	.6200+01	.56200+02
.20106+01	.78229+00	.42578+00	.1600+02	.25600+03	.6400+01	.56400+02
.20734+01	.74869+00	.48175+00	.1650+02	.27225+03	.6600+01	.56600+02
.21363+01	.71500+00	.53583+00	.1700+02	.28900+03	.6800+01	.56800+02

THETA	STHETA	CYHETA	X	Y	Z	Q
.21991+01	.80902+00	-.58778+00	.17500+02	.30625+03	.70000+01	.57000+02
.22619+01	.77051+00	-.63742+00	.18000+02	.32400+03	.72000+01	.57200+02
.23248+01	.72897+00	-.68455+00	.19500+02	.34225+03	.74000+01	.57400+02
.23876+01	.68455+00	-.72897+00	.19000+02	.36100+03	.76000+01	.57600+02
.24504+01	.63743+00	-.77051+00	.19500+02	.38025+03	.78000+01	.57800+02
.25133+01	.58779+00	-.80902+00	.20000+02	.40000+03	.80000+01	.58000+02
.25761+01	.53583+00	-.84733+00	.20500+02	.42025+03	.82000+01	.58200+02
.26389+01	.48176+00	-.88631+00	.21000+02	.44100+03	.84000+01	.58400+02
.27018+01	.42578+00	-.92578+00	.21500+02	.46225+03	.86000+01	.58600+02
.27646+01	.36813+00	-.96510+00	.22000+02	.48400+03	.88000+01	.58800+02
.28274+01	.30902+00	-.95106+00	.22500+02	.50625+03	.90000+01	.59000+02
.28903+01	.24869+00	-.98598+00	.23000+02	.52900+03	.92000+01	.59200+02
.29531+01	.18738+00	-.98229+00	.23500+02	.55225+03	.94000+01	.59400+02
.30159+01	.12534+00	-.95211+00	.24000+02	.57600+03	.96000+01	.59600+02
.30788+01	.62793-01	-.99803+00	.24500+02	.60025+03	.98000+01	.59800+02
.31416+01	.30418-05	-.10000+01	.25000+02	.62500+03	.10000+02	.60000+02
.32044+01	-.62787-01	-.99803+00	.25500+02	.65025+03	.10200+02	.60200+02
.32673+01	-.12533+00	-.9912+00	.26000+02	.67600+03	.10400+02	.60400+02
.33301+01	-.18738+00	-.98229+00	.26500+02	.70225+03	.10600+02	.60600+02
.33929+01	-.24869+00	-.96598+00	.27000+02	.72900+03	.10800+02	.60800+02
.34557+01	-.30901+00	-.95106+00	.27500+02	.75625+03	.11000+02	.61000+02
.35186+01	-.36812+00	-.92578+00	.28000+02	.78400+03	.11200+02	.61200+02
.35814+01	-.42578+00	-.90183+00	.28500+02	.81225+03	.11400+02	.61400+02
.36442+01	-.48175+00	-.87531+00	.29000+02	.84100+03	.11600+02	.61600+02
.37071+01	-.53582+00	-.84733+00	.29500+02	.87025+03	.11800+02	.61800+02
.37699+01	-.58778+00	-.80902+00	.30000+02	.90000+03	.12000+02	.62000+02
.38327+01	-.63742+00	-.77052+00	.30500+02	.93025+03	.12200+02	.62200+02
.38956+01	-.68454+00	-.72897+00	.31000+02	.96100+03	.12400+02	.62400+02
.39584+01	-.72897+00	-.68455+00	.31500+02	.99225+03	.12600+02	.62600+02
.40212+01	-.77051+00	-.63743+00	.32000+02	.10240+04	.12800+02	.62800+02
.40841+01	-.80901+00	-.58779+00	.32500+02	.10562+04	.13000+02	.63000+02
.41469+01	-.84733+00	-.53583+00	.33000+02	.10890+04	.13200+02	.63200+02
.42097+01	-.87630+00	-.48176+00	.33500+02	.11222+04	.13400+02	.63400+02
.42726+01	-.90483+00	-.42578+00	.34000+02	.11560+04	.13600+02	.63600+02
.43354+01	-.92977+00	-.36813+00	.34500+02	.11902+04	.13800+02	.63800+02
.43982+01	-.95106+00	-.30902+00	.35000+02	.12250+04	.14000+02	.64000+02
.44611+01	-.96858+00	-.24869+00	.35500+02	.12602+04	.14200+02	.64200+02
.45239+01	-.98229+00	-.18739+00	.36000+02	.12960+04	.14400+02	.64400+02
.45867+01	-.99211+00	-.12534+00	.36500+02	.13322+04	.14600+02	.64600+02
.46496+01	-.99803+00	-.62795-01	.37000+02	.13690+04	.14800+02	.64800+02
.47124+01	-.10000+01	-.49349-05	.37500+02	.14063+04	.15000+02	.65000+02
.47752+01	-.99803+00	-.62785-01	.38000+02	.14440+04	.15200+02	.65200+02
.48380+01	-.99212+00	.12533+00	.38500+02	.14822+04	.15400+02	.65400+02
.49009+01	-.98229+00	.18738+00	.39000+02	.15210+04	.15600+02	.65600+02
.49637+01	-.96858+00	.24868+00	.39500+02	.15602+04	.15800+02	.65800+02
.50265+01	-.95106+00	.30901+00	.40000+02	.16000+04	.16000+02	.66000+02

TMETA	STMETA	CTMETA	X	Y	Z	Q
.50894+01	-.929+9+00	.36812+00	.40500+02	.18402+04	.16200+02	.64200+02
.51522+01	-.90483+00	.42577+00	.41000+02	.16010+04	.16400+02	.66400+02
.52150+01	-.87631+00	.48175+00	.41500+02	.17222+04	.16600+02	.68600+02
.52779+01	-.84433+00	.53582+00	.42000+02	.17640+04	.16800+02	.68800+02
.53407+01	-.80902+00	.58778+00	.42500+02	.18062+04	.17000+02	.67000+02
.54035+01	-.77052+00	.63742+00	.43000+02	.18490+04	.17200+02	.67200+02
.54664+01	-.72897+00	.68454+00	.43500+02	.18922+04	.17400+02	.67400+02
.55292+01	-.68455+00	.72896+00	.44000+02	.19360+04	.17600+02	.67600+02
.55920+01	-.63743+00	.77051+00	.44500+02	.19802+04	.17800+02	.67800+02
.56549+01	-.58779+00	.80901+00	.45000+02	.20250+04	.18000+02	.68000+02
.57177+01	-.53583+00	.84432+00	.45500+02	.20702+04	.18200+02	.68200+02
.57805+01	-.48176+00	.87630+00	.46000+02	.21160+04	.18400+02	.68400+02
.58434+01	-.42579+00	.90482+00	.46500+02	.21622+04	.18600+02	.68600+02
.59062+01	-.36813+00	.92977+00	.47000+02	.22090+04	.18800+02	.68800+02
.59690+01	-.30902+00	.95105+00	.47500+02	.22562+04	.19000+02	.69000+02
.60319+01	-.24870+00	.96858+00	.48000+02	.23040+04	.19200+02	.69200+02
.60947+01	-.18739+00	.98229+00	.48500+02	.23522+04	.19400+02	.69400+02
.61575+01	-.12534+00	.99211+00	.49000+02	.24010+04	.19600+02	.69600+02
.62203+01	-.62798-01	.99803+00	.49500+02	.24502+04	.19800+02	.69800+02
.62832+01	-.73353-05	.10000+01	.50000+02	.25000+04	.20000+02	.70000+02
.63460+01	-.62783-01	.99803+00	.50500+02	.25502+04	.20200+02	.70200+02
.64088+01	.12533+00	.99212+00	.51000+02	.26010+04	.20400+02	.70400+02
.64717+01	.18737+00	.98229+00	.51500+02	.26522+04	.20600+02	.70600+02
.65345+01	.24868+00	.96859+00	.52000+02	.27040+04	.20800+02	.70800+02
.65973+01	.30901+00	.95106+00	.52500+02	.27562+04	.21000+02	.71000+02
.66602+01	.36812+00	.92978+00	.53000+02	.28090+04	.21200+02	.71200+02
.67230+01	.42577+00	.90483+00	.53500+02	.28622+04	.21400+02	.71400+02
.67858+01	.48175+00	.87631+00	.54000+02	.29160+04	.21600+02	.71600+02
.68487+01	.53582+00	.84433+00	.54500+02	.29702+04	.21800+02	.71800+02
.69115+01	.58778+00	.80902+00	.55000+02	.30250+04	.22000+02	.72000+02
.69743+01	.63742+00	.77052+00	.55500+02	.30802+04	.22200+02	.72200+02
.70372+01	.68454+00	.72897+00	.56000+02	.31360+04	.22400+02	.72400+02
.71000+01	.72896+00	.68455+00	.56500+02	.31922+04	.22600+02	.72600+02
.71628+01	.77051+00	.63743+00	.57000+02	.32490+04	.22800+02	.72800+02
.72257+01	.80901+00	.58779+00	.57500+02	.33062+04	.23000+02	.73000+02
.72885+01	.84432+00	.53583+00	.58000+02	.33640+04	.23200+02	.73200+02
.73513+01	.87630+00	.48176+00	.58500+02	.34222+04	.23400+02	.73400+02
.74141+01	.90482+00	.42579+00	.59000+02	.34810+04	.23600+02	.73600+02
.74770+01	.92977+00	.36813+00	.59500+02	.35402+04	.23800+02	.73800+02
.75398+01	.95105+00	.30903+00	.60000+02	.36000+04	.24000+02	.74000+02
.76026+01	.96858+00	.24870+00	.60500+02	.36602+04	.24200+02	.74200+02
.76655+01	.98229+00	.18739+00	.61000+02	.37210+04	.24400+02	.74400+02
.77283+01	.99211+00	.12534+00	.61500+02	.37820+04	.24600+02	.74600+02
.77911+01	.99803+00	.62800-01	.62000+02	.38440+04	.24800+02	.74800+02
.78540+01	.10000+01	.96758-05	.62500+02	.39063+04	.25000+02	.75000+02
.79168+01	.99803+00	-.62781-01	.63000+02	.39690+04	.25200+02	.75200+02

THETA	SYNTHETA	CTHETA	X	Y	Z	Q
.79796+01	.99212+00	-.12532+00	.63500+02	.40322+04	.25400+02	.75400+02
.80425+01	.98229+00	-.18737+00	.64000+02	.40960+04	.25600+02	.75600+02
.81053+01	.96859+00	-.24868+00	.64500+02	.41602+04	.25800+02	.75800+02
.81681+01	.95106+00	-.30901+00	.65000+02	.42250+04	.26000+02	.76000+02
.82310+01	.92978+00	-.36912+00	.65500+02	.42902+04	.26200+02	.76200+02
.82938+01	.90483+00	-.42577+00	.66000+02	.43560+04	.26400+02	.76400+02
.83566+01	.87631+00	-.48174+00	.66500+02	.44222+04	.26600+02	.76600+02
.84195+01	.84423+00	-.53582+00	.67000+02	.44890+04	.26800+02	.76800+02
.84823+01	.80902+00	-.58778+00	.67500+02	.45562+04	.27000+02	.77000+02
.85451+01	.77052+00	-.63742+00	.68000+02	.46240+04	.27200+02	.77200+02
.86080+01	.72898+00	-.68453+00	.68500+02	.46922+04	.27400+02	.77400+02
.86708+01	.68456+00	-.72896+00	.69000+02	.47610+04	.27600+02	.77600+02
.87336+01	.63743+00	-.77051+00	.69500+02	.48302+04	.27800+02	.77800+02
.87964+01	.58779+00	-.80901+00	.70000+02	.49000+04	.28000+02	.78000+02
.88593+01	.53584+00	-.84432+00	.70500+02	.49702+04	.28200+02	.78200+02
.89221+01	.48176+00	-.87630+00	.71000+02	.50410+04	.28400+02	.78400+02
.89849+01	.42579+00	-.90482+00	.71500+02	.51122+04	.28600+02	.78600+02
.90478+01	.36814+00	-.92977+00	.72000+02	.51840+04	.28800+02	.78800+02
.91106+01	.30903+00	-.95105+00	.72500+02	.52562+04	.29000+02	.79000+02
.91734+01	.24870+00	-.96858+00	.73000+02	.53290+04	.29200+02	.79200+02
.92363+01	.18739+00	-.98229+00	.73500+02	.54022+04	.29400+02	.79400+02
.92991+01	.12534+00	-.99211+00	.74000+02	.54760+04	.29600+02	.79600+02
.93619+01	.65802-01	-.99803+00	.74500+02	.55502+04	.29800+02	.79800+02
.94248+01	.12016-04	-.10000+01	.75000+02	.56250+04	.30000+02	.80000+02
.94876+01	-.62778-01	-.99803+00	.75500+02	.57002+04	.30200+02	.80200+02
.95504+01	-.12532+00	-.99212+00	.76000+02	.57760+04	.30400+02	.80400+02
.96133+01	-.18737+00	-.98229+00	.76500+02	.58522+04	.30600+02	.80600+02
.96761+01	-.24868+00	-.96859+00	.77000+02	.59290+04	.30800+02	.80800+02
.97389+01	-.30901+00	-.95106+00	.77500+02	.60062+04	.31000+02	.81000+02
.98018+01	-.36811+00	-.92978+00	.78000+02	.60840+04	.31200+02	.81200+02
.98646+01	-.42577+00	-.90483+00	.78500+02	.61622+04	.31400+02	.81400+02
.99274+01	-.48174+00	-.87631+00	.79000+02	.62410+04	.31600+02	.81600+02
.99903+01	-.53582+00	-.84433+00	.79500+02	.63202+04	.31800+02	.81800+02
.10053+02	-.58777+00	-.80902+00	.80000+02	.64000+04	.32000+02	.82000+02
.10116+02	-.63741+00	-.77052+00	.80500+02	.64802+04	.32200+02	.82200+02
.10179+02	-.68454+00	-.72898+00	.81000+02	.65610+04	.32400+02	.82400+02
.10242+02	-.72896+00	-.68456+00	.81500+02	.66422+04	.32600+02	.82600+02
.10304+02	-.77050+00	-.63743+00	.82000+02	.67240+04	.32800+02	.82800+02
.10367+02	-.80901+00	-.58780+00	.82500+02	.68062+04	.33000+02	.83000+02
.10430+02	-.84432+00	-.53584+00	.83000+02	.68890+04	.33200+02	.83200+02
.10493+02	-.87630+00	-.48177+00	.83500+02	.69722+04	.33400+02	.83400+02
.10556+02	-.90482+00	-.42579+00	.84000+02	.70560+04	.33600+02	.83600+02
.10619+02	-.92977+00	-.36814+00	.84500+02	.71402+04	.33800+02	.83800+02
.10681+02	-.95105+00	-.30903+00	.85000+02	.72250+04	.34000+02	.84000+02
.10744+02	-.96858+00	-.24870+00	.85500+02	.73102+04	.34200+02	.84200+02
.10807+02	-.98228+00	-.18740+00	.86000+02	.73960+04	.34400+02	.84400+02

TMETA	STMETA	CTMETA	X	Y	Z	Q
.10970+02	-.99211+00	-.12535+00	.06500+02	.74022+04	.34600+02	.04600+02
.10933+02	-.99803+00	-.62805+01	.07000+02	.75690+04	.34300+02	.04800+02
.10996+02	-.10000+01	-.14357+04	.07500+02	.76563+04	.35000+02	.05000+02
.11058+02	-.99803+00	.62776+01	.08000+02	.77440+04	.35200+02	.05200+02
.11121+02	-.99212+00	.12532+00	.08500+02	.78322+04	.35400+02	.05400+02
.11184+02	-.98229+00	.19737+00	.09000+02	.79210+04	.35600+02	.05600+02
.11247+02	-.98059+00	.24868+00	.09500+02	.80102+04	.35800+02	.05800+02
.11310+02	-.95106+00	.30900+00	.09000+02	.81000+04	.36000+02	.06000+02
.11373+02	-.92978+00	.36811+00	.90500+02	.81902+04	.36200+02	.06200+02
.11435+02	-.90483+00	.42577+00	.91000+02	.82810+04	.36400+02	.06400+02
.11498+02	-.87631+00	.48174+00	.91500+02	.83722+04	.36600+02	.06600+02
.11561+02	-.84434+00	.53781+00	.92000+02	.84648+04	.36800+02	.06800+02
.11624+02	-.80903+00	.58777+00	.92500+02	.85562+04	.37000+02	.07000+02
.11687+02	-.77052+00	.63741+00	.93000+02	.86490+04	.37200+02	.07200+02
.11750+02	-.72898+00	.68454+00	.93500+02	.87422+04	.37400+02	.07400+02
.11812+02	-.68456+00	.72896+00	.94000+02	.88360+04	.37600+02	.07600+02
.11875+02	-.63744+00	.77050+00	.94500+02	.89342+04	.37800+02	.07800+02
.11938+02	-.58780+00	.80901+00	.95000+02	.90250+04	.38000+02	.08000+02
.12001+02	-.53584+00	.84432+00	.95500+02	.91202+04	.38200+02	.08200+02
.12064+02	-.48177+00	.87630+00	.96000+02	.92160+04	.38400+02	.08400+02
.12127+02	-.42579+00	.90482+00	.96500+02	.93122+04	.38600+02	.08600+02
.12189+02	-.36814+00	.92977+00	.97000+02	.94090+04	.38800+02	.08800+02
.12252+02	-.30903+00	.95105+00	.97500+02	.95062+04	.39000+02	.09000+02
.12315+02	-.24871+00	.96858+00	.98000+02	.96040+04	.39200+02	.09200+02
.12378+02	-.18740+00	.98228+00	.98500+02	.97022+04	.39400+02	.09400+02
.12441+02	-.12535+00	.99211+00	.99000+02	.98010+04	.39600+02	.09600+02
.12504+02	-.62807+01	.99803+00	.99500+02	.99002+04	.39800+02	.09800+02
.12566+02	-.16697+04	.10000+01	.10000+03	.10000+05	.40000+02	.90000+02

DISPLAY NO. 2

RECORD NUMBER	STNETA	LAT DEG	TIME D:M:S	DOMT DDP..	RECORD LABEL A-FORMAT DATA	RECORD NO.
5	.25	.25 N	0:00:04:30.	.2700000000+003	RECORD NO.	5
6	.43	.44 N	0:00:07:30.	.4500000000+003	RECORD NO.	6
11	.59	.63 N	0:00:10:30.	.6300000000+003	RECORD NO.	11
14	.73	.82 N	0:00:13:30.	.8100000000+003	RECORD NO.	14
17	.84	1.01 N	0:00:16:30.	.9900000000+003	RECORD NO.	17
20	.93	1.19 N	0:00:19:30.	.1170000000+004	RECORD NO.	20
23	.98	1.38 N	0:00:22:30.	.1350000000+004	RECORD NO.	23
26	1.00	1.57 N	0:00:25:30.	.1530000000+004	RECORD NO.	26
29	.98	1.76 N	0:00:28:30.	.1710000000+004	RECORD NO.	29
32	.93	1.95 N	0:00:31:30.	.1890000000+004	RECORD NO.	32
35	.84	2.14 N	0:00:34:30.	.2070000000+004	RECORD NO.	35
38	.73	2.32 N	0:00:37:30.	.2250000000+004	RECORD NO.	38
41	.59	2.51 N	0:00:40:30.	.2430000000+004	RECORD NO.	41
44	.43	2.70 N	0:00:43:30.	.2610000000+004	RECORD NO.	44
47	.25	2.89 N	0:00:46:30.	.2790000000+004	RECORD NO.	47
50	.06	3.08 N	0:00:49:30.	.2970000000+004	RECORD NO.	50
53	-.13	3.27 N	0:00:52:30.	.3150000000+004	RECORD NO.	53
56	-.31	3.46 N	0:00:55:30.	.3330000000+004	RECORD NO.	56
59	-.48	3.64 N	0:00:58:30.	.3510000000+004	RECORD NO.	59
62	-.64	3.83 N	0:01:01:30.	.3690000000+004	RECORD NO.	62
65	-.77	4.02 N	0:01:04:30.	.3870000000+004	RECORD NO.	65
68	-.88	4.21 N	0:01:07:30.	.4050000000+004	RECORD NO.	68
71	-.95	4.40 N	0:01:10:30.	.4230000000+004	RECORD NO.	71
74	-.99	4.59 N	0:01:13:30.	.4410000000+004	RECORD NO.	74
77	-1.00	4.78 N	0:01:16:30.	.4590000000+004	RECORD NO.	77
80	-.97	4.96 N	0:01:19:30.	.4770000000+004	RECORD NO.	80
83	-.90	5.15 N	0:01:22:30.	.4950000000+004	RECORD NO.	83
86	-.81	5.34 N	0:01:25:30.	.5130000000+004	RECORD NO.	86
89	-.68	5.53 N	0:01:28:30.	.5310000000+004	RECORD NO.	89
92	-.54	5.72 N	0:01:31:30.	.5490000000+004	RECORD NO.	92

DISPLAY NO. 3

Z	O	STNETA	CTNETA
.10000+02	.12100+03	.30410-09	-.10000+01
.10400+02	.12100+03	-.12533+00	-.99212+00
.10800+02	.12200+03	-.24069+00	-.96050+00
.11200+02	.12340+03	-.30012+00	-.92970+00
.11600+02	.12420+03	-.40175+00	-.87631+00
.12000+02	.12500+03	-.50770+00	-.80902+00
.12400+02	.12500+03	-.60454+00	-.72007+00
.13000+02	.12700+03	-.80901+00	-.50770+00
.13600+02	.12820+03	-.90402+00	-.42570+00
.15000+02	.13100+03	-.10000+01	-.49949+05
.16400+02	.13300+03	-.90403+00	.42577+00
.17000+02	.13500+03	-.80902+00	.50770+00
.17600+02	.13620+03	-.60455+00	.72006+00
.18000+02	.13700+03	-.50779+00	.80901+00
.18400+02	.13700+03	-.40176+00	.87630+00
.18800+02	.13800+03	-.30013+00	.92977+00
.19200+02	.13940+03	-.24070+00	.96050+00
.19600+02	.14020+03	-.12534+00	.99211+00
.20000+02	.14100+03	-.73353+05	.10000+01
.20400+02	.14100+03	.12533+00	.99212+00

DISPLAY NUMBER 4 - SEQUENCE OF EVENTS DISPLAY

IREC	X	STMETA	ADATA	DGMT
.12000.02	.55000.01	.83742.00	RECORD NO. 12	.8900000000.003
.22000.02	.10500.02	.90050.00	RECORD NO. 22	.1290000000.004
.00000.02	.29500.02	-.53502.00	RECORD NO. 00	.3570000000.004
.13200.03	.75500.02	-.62770.01	RECORD NO. 192	.9090000000.004

DISPLAY NUMBER 5 - EVENT DISPLAY WITH MULTIPLE PRINT LISTS

DESCRIPTION OF VALUE	VALUE
X - VALUE	.10000+03
Y - VALUE	.10000+05
S - VALUE	.00000+02
RECORD NUMBER	.20100+03

DISPLAY NUMBER 6 - SEQUENCE OF EVENTS DISPLAY

INEC	X	Z	STHETA
.12000+02	.99000+01	.22000+01	.03742+00
.22010+02	.10900+02	.42000+01	.98090+00
.60000+02	.20900+02	.11000+02	-.93502+00
.19200+03	.79900+02	.30200+02	-.62770-01

DISPLAY NUMBER 6 - SEQUENCE OF EVENTS DISPLAY
SECOND DISPLAY ON A PAGE

INEC	X	Z	STHETA
.12000+02	.99000+01	.22000+01	.03742+00
.22000+02	.10900+02	.42000+01	.98090+00
.19200+03	.79900+02	.30200+02	-.62770-01

DISPLAY NUMBER 7 - REPEATING EVENT DISPLAY

IREC	THETA	STHETA
0	.43902+00	.42577096+00
9	.50265+00	.40175330+00
10	.56549+00	.53502639+00
11	.62032+00	.50778402+00
41	.25133+01	.50778720+00
42	.25761+01	.53502000+00
43	.26309+01	.40175509+00
44	.27010+01	.42578164+00
100	.67230+01	.42577206+00
109	.67050+01	.40174659+00
110	.60407+01	.53501909+00
111	.69115+01	.50777056+00
141	.07964+01	.50779421+00
142	.00593+01	.53503623+00
143	.09221+01	.40176355+00
144	.09849+01	.42578957+00

END-OF-FILE ON PLOT UNIT.

FOLLOWING EVENTS WERE NOT ON PLOT FILE.

EVENT • 1

DISPLAY NO. 0

USER DEFINED FORMAT	.31415096+01
.100001+01	-.100000+01
USER DEFINED FORMAT	.32672532+01
.749340+00	-.992115+00
USER DEFINED FORMAT	.33929168+01
.502627+00	-.968584+00
USER DEFINED FORMAT	.35185803+01
.263757+00	-.929778+00
USER DEFINED FORMAT	.36442439+01
.364989-01	-.876308+00
USER DEFINED FORMAT	.37699075+01
-.175565+00	-.809019+00
USER DEFINED FORMAT	.38955711+01
-.369089+00	-.728971+00
USER DEFINED FORMAT	.40840664+01
-.618029+00	-.587789+00
USER DEFINED FORMAT	.42725617+01
-.809650+00	-.425783+00
USER DEFINED FORMAT	.47123840+01
-.100000+01	-.499487-05
USER DEFINED FORMAT	.51522063+01
-.809659+00	.425774+00
USER DEFINED FORMAT	.53407016+01
-.618041+00	.587780+00
USER DEFINED FORMAT	.55291969+01
-.369103+00	.728964+00
USER DEFINED FORMAT	.56548604+01
-.175581+00	.809013+00
USER DEFINED FORMAT	.57805239+01
.364811-01	.876304+00
USER DEFINED FORMAT	.59061874+01
.263738+00	.929774+00
USER DEFINED FORMAT	.60318509+01
.502607+00	.968581+00
USER DEFINED FORMAT	.61575145+01
.749319+00	.992114+00
USER DEFINED FORMAT	.62831780+01
.999985+00	.100000+01
USER DEFINED FORMAT	.64088415+01
.125065+01	.992116+00

DISPLAY NUMBER 9 - SEQUENCE OF EVENTS DISPLAY

RECORD NO.	12.			
X =	.55000000+01	Z =	.2200+01THETA=	.637424+00
RECORD NO.	22.			
X =	.10500000+02	Z =	.4200+01THETA=	.968583+00
RECORD NO.	60.			
X =	.29500000+02	Z =	.1180+02THETA=	-.535824+00
RECORD NO.	152.			
X =	.75500000+02	Z =	.3020+02THETA=	-.627784-01

DISPLAY NUMBER 10 - SEQUENCE OF EVENTS DISPLAY

RECORD NO.	12.			
X =	.55000000+01	Z =	.2200+01THETA=	.637424+00
RECORD NO.	22.			
X =	.10500000+02	Z =	.4200+01THETA=	.968583+00
RECORD NO.	80.			
X =	.29500000+02	Z =	.1100+02THETA=	-.535824+00
RECORD NO.	152.			
X =	.75500000+02	Z =	.3020+02THETA=	-.627784-01